NUCLEONICA Progress Meeting
Dialogika/ITU
Karlsruhe, 22 March 2006

Nuclide Explorer: First observations
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- n (neutron emission) should be added as a decay mode
- show all nuclides with decay mode… when I select “none” all the check boxes should be unchecked. When I select all, they should all be checked
- When I click on a nuclide, a blank page appears
- Element select box is NOT working: try Au191.

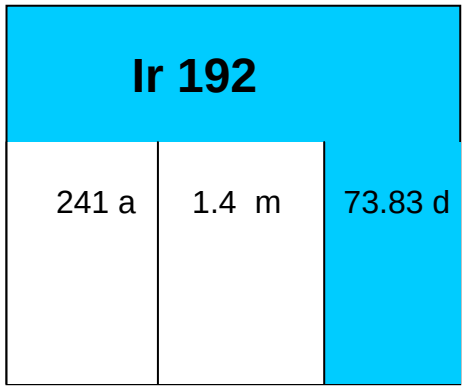
    (note that when we select an element e.g. Au, there should be NO screen refresh. Screen refresh only when the isotope has been selected e.g. Au191)

- When I click on Au191 in main window, the screen should reload with this nuclide at the centre.
- See printout of Au 191: we need to get Nucleonica and the K’he chart as similar as possible - is there a simple way of doing this?
- draw the magic lines in the same way as NuDat2,

Nuclide box sub-structure…
3 steps:

- Step 1:

  At present, the only sub-structure we have is to show metastable states. In some cases there are two metastable states (m and n states). Nucleonica shows this differently to the K'he chart. Is it possible to make it more like the K'he chart?

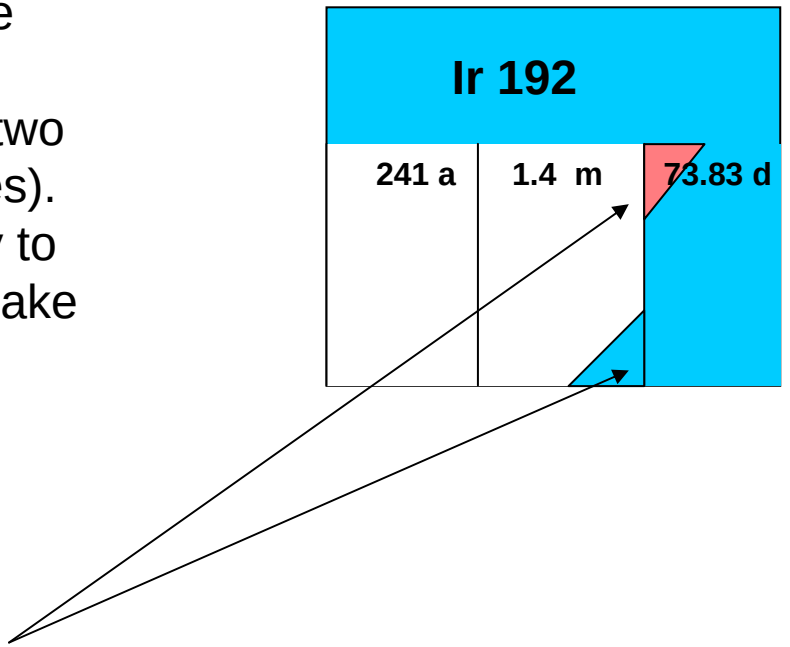


  In a later step, we will add small coloured triangles to indicate multiple modes of decay……

Nuclide box sub-structure…

- Step 1 (cont'd):

  At present, the only sub-structure we have is to show metastable states. In some cases there are two metastable states (m and n states). Nucleonica shows this differently to the K'he chart. Is it possible to make it more like the K'he chart?



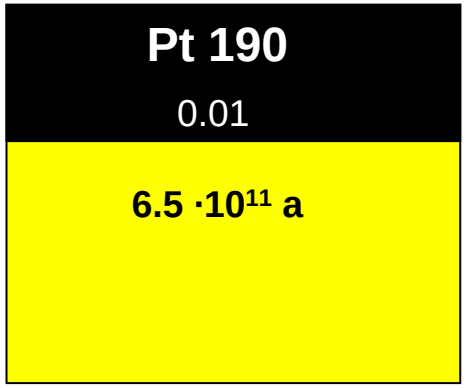
  In a later step, we will add small coloured triangles to indicate multiple modes of decay

Nuclide box sub-structure…

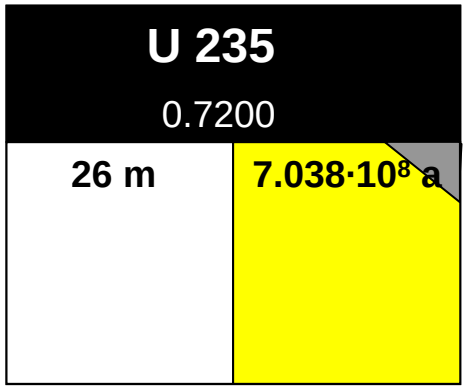
- Step 2:

  Show primordial nuclides (25 in total). An example of such a primordial nuclide is shown for Pt 190…

  In the top black section, the 0.01 refers to the abundance (the the DB)



A more complicated example is U 235….



Nuclide box sub-structure…

• Step 3:

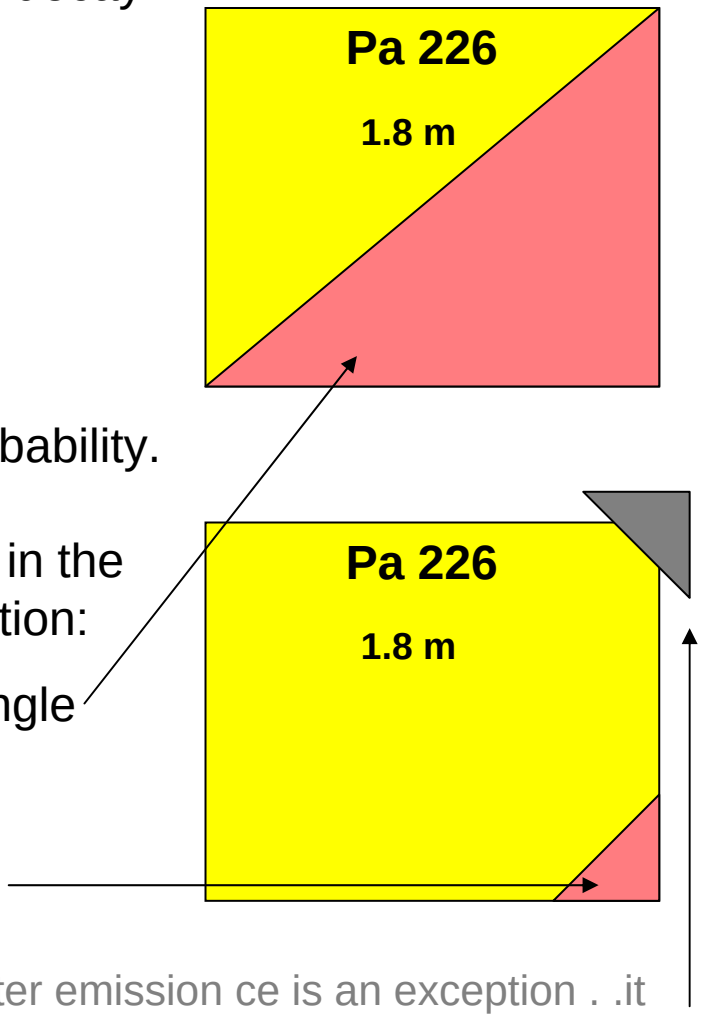
Introduce large coloured triangles to indicate multiple decay modes. Consider the nuclide Pa 226.If you look up Nuclides.net you see that the modes of decay are:

Mode	Branching Ratio
α	0.74
ß+	0.26

i.e. the main mode is alpha emission with a 74% probability. The subsidiary mode is ß+ with 26% probability. The subsidiary mode must always have a branching ratio in the range 0<BR<50%. We now use the following convention:

if 5%<BR<50% then include a large triangle (red triangle shown here).

If the BR of the subsidiary mode is less than 5% (i.e. 0<BR<5%) then use a small triangle…….



Why is the small red triangle at the bottom right? The “order” is given by….p, α, ε/ß+, IT, ß-, sf, n.

Cluster emission ce is an exception . .it is a small grey triangle at the top right corner.

Nuclide box sub-structure…

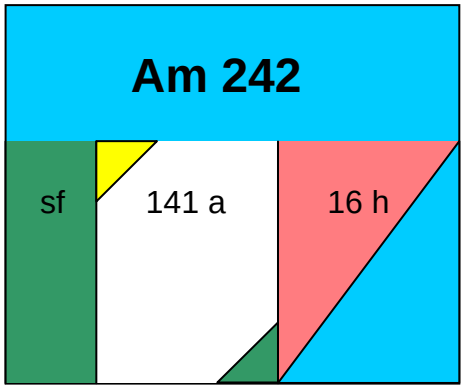
- Step 3 (cont'd):

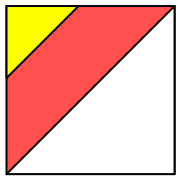
What happens if there are more than 2 modes of decay??

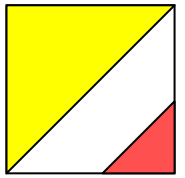
Here are some examples…

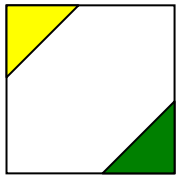
Note that these are very special cases.. only a few nuclides are involved.

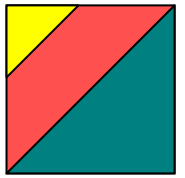
The same can arise with metastable states..

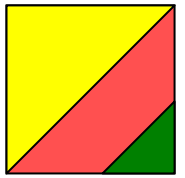


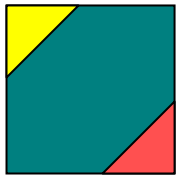

Au184m


Ac222m

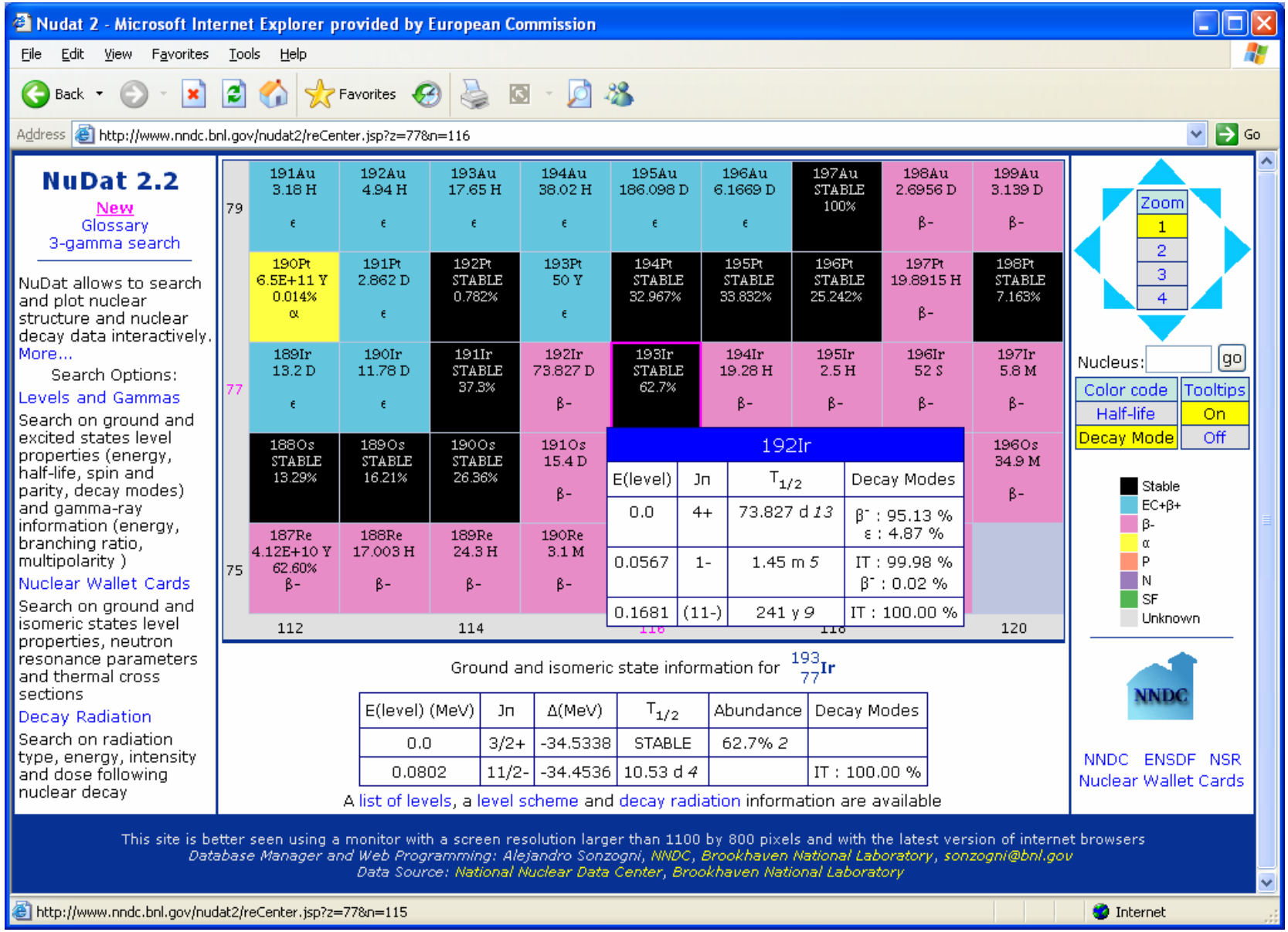

Am242m


Ac226


No254


Es254

The competition solves this problem with *tooltips* – not very satisfactory - we can do it better (although using *tooltips* is a good idea)



Is there a simple way of doing this?

Some observations:

- It is not necessary to have the particles and energies.

  In the paper chart this is forced into a small box. In an electronic product, we have all info in the Datasheets.

- It is not necessary to have various sized triangles

  corresponding to the magnitude of the branching ratios. Again all this data/information is in the Datasheets

- It is not necessary to adhere to the ordering process in the K'he chart

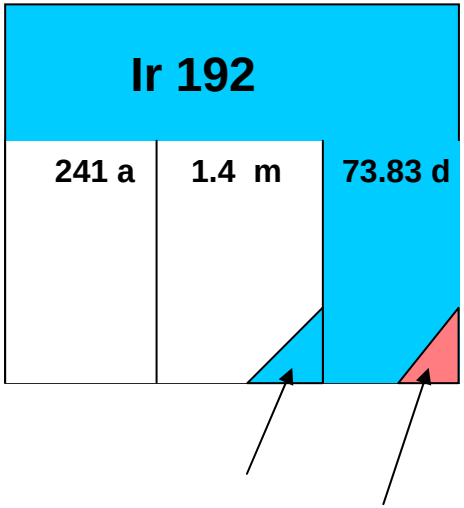
- It is necessary to indicate multiple modes of decay

  This is in order to enable the user to quickly see which daughters or decay products can arise

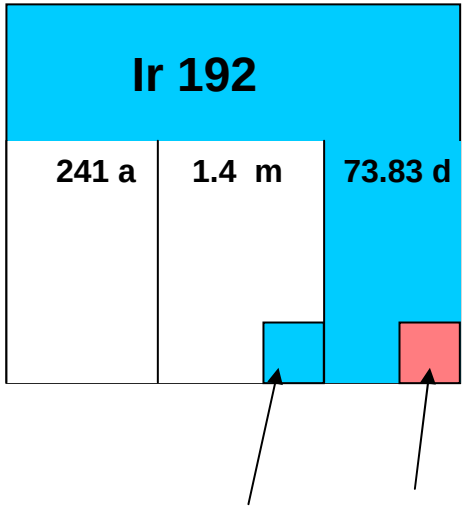
How to indicate multiple decay modes…..

Basic modes (p, α , ε/ß+, IT, ß-, sf, n)* ….these determine the main colour of the box or box section (for metastable states)

One additional mode of decay….



Additional modes info is located at the bottom right

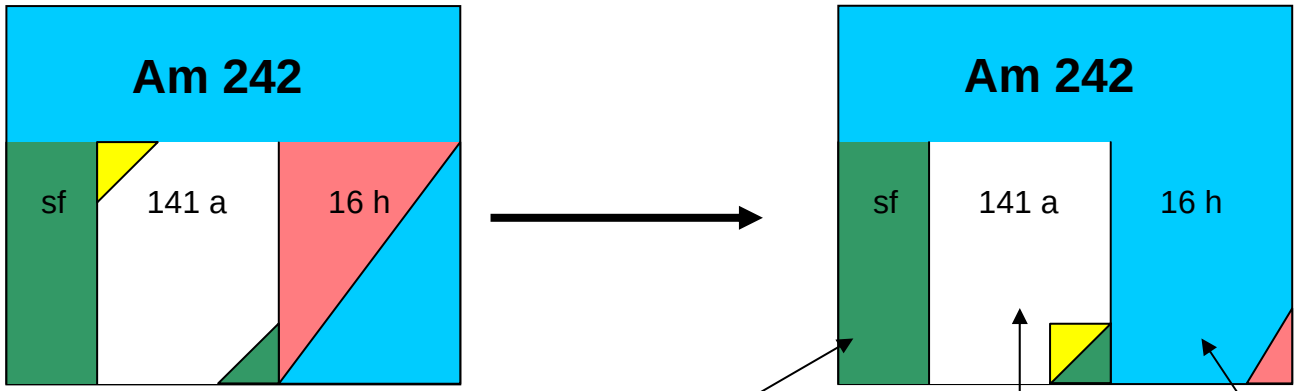


Square boxes can be used if triangles are a problem

*ce (cluster emission) is not included – this is treated separately

How to indicate multiple decay modes (cont'd)…..

two additional mode of decay….



2nd metastable state (n)…

Main mode is sf (green)

1st metastable state (m)..

Main mode is IT (white)(99.5%)

second most important mode is α (yellow)

Third most important mode is sf (green)

Ground state..

Main mode is ß- (82.7%), hence blue

second mode is ε/ß+ hence red triangle

I think this latter approach is much easier to program. One could imagine an invisible square for every nuclide or metastable state. Then only if there are additional modes of decay do the square become active.

that’s it!!